Reversible motor driver

BA6222

The BA6222 is a reversible-motor driver with a maximum output current of 2.2A. Two logic inputs allow four output modes : forward, reverse, idling, and braking. The motor revolving speed can be set arbitrarily by controlling the voltage applied to the motor.

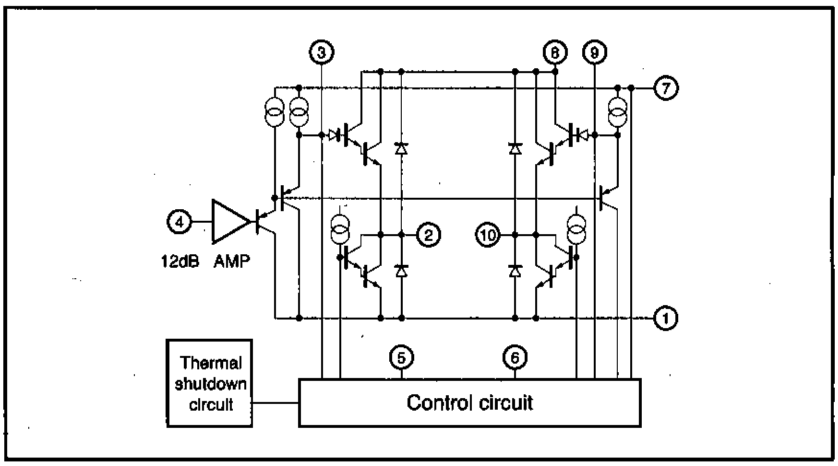
●Applications

VCRs

●Features

1) Large output current. ($I_{OMax.}$=2.2A)
2) Built-in thermal shutdown circuit.
3) Output voltage can be adjusted arbitrarily with the output voltage setting pin. Because the pin has a gain of 11.4dB, a high output voltage can be set with a low input voltage.
4) Small standby circuit current.

●Block diagram



●Equivalent circuit for pins 5 and 6

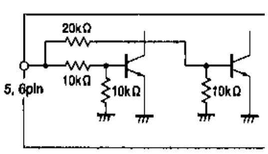


Fig.1

●Input/output truth table

5pin (IN)	6pin (IN)	2pin (OUT)	10pin (OUT)
L	L	OPEN	OPEN
H	L	H	L
L	H	L	H
H	H	L	L

Note: (1) HIGH level input is 3.0 V or more
(2) LOW level input is 1.0 V or less

●Absolute maximum ratings (Ta=25℃)

Parameter	Symbol	Limits	Unit
Power supply voltage	V_{CC1}, V_{CC2}	24	V
Power dissipation	Pd	2000*1	mW
Operating temperature	Topr	−20~75	℃
Storage temperature	Tstg	−50~125	℃
Output current	Io	2.2*2	A
Input voltage	V_{IN}	−0.3~V_{CC1}+0.3	V

*1 Reduce power by 20 mW for each degree above 25 ℃.
*2 500 μs pulse with a duty ratio of 1%.

●Electrical characteristics (Unless otherwise specified : Ta=25℃, V_{CC}=12V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Operating voltage	V_{CC}, V_{CC2}	8	−	18	V	−
Current consumption 1	I_{CC1}	−	1.2	2.5	mA	5pin, 6pin ; "L" , 4pin=0V
Current consumption 2	I_{CC2}	−	16	35	mA	Either pin 5 or 6 is HIGH, the other is LOW; pin 4 = 0 V
Current consumption 3	I_{CC3}	−	25	60	mA	5pin, 6pin; "H" , 4pin=0V
Input threshold voltage of pins 5 and 6	V_{TH5}, V_{TH6}	1.0	2.0	3.0	V	LOW level = 1 V, HIGH level = 3 V
HIGH level output voltage of pin 2	V_{H2}	9.5	−	−	V	Io=0.1A, 4pin=5V
LOW level output voltage of pin 2	V_{L2}	−	−	0.5	V	Io=0.1A, 4pin=5V
HIGH level output voltage of pin 10	V_{H10}	9.5	−	−	V	Io=0.1A, 4pin=5V
LOW level output voltage of pin 10	V_{L10}	−	−	0.5	V	Io=0.1A, 4pin=5V
Bias current of pin 4	I_{b4}	−	1.2	5.0	μA	4pin=1.0V
Output gain of pin 4	Gv	10.35	11.35	12.35	dB	4pin→2 (10) pin, Io=100mA*
Output leakage current	I_{OL}	−	−	1	mA	5pin, 6pin; "L"

* V_{OUT1} is the difference between the HIGH and LOW level output voltages when pin 4 = 1 V.
V_{OUT2} is the difference between the HIGH and LOW level output voltages when pin 4 = 2 V.

$$G_V = 20 \log \left[\frac{V_{OUT2} - V_{OUT1}}{2V - 1V} \right]$$

V_{OUT1} and V_{OUT2} are the values at which a stable output is obtained with no heat sink.

●Application example

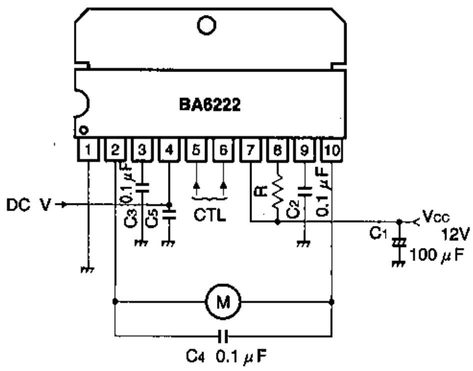


Fig.2

●Operation notes

(1) Output voltage control pin (pin 4)

The voltage at pin 4 is related to the HIGH output voltage (V_{OH}) as follows :

$$V_{OH}=4 \times V_4 + V_{ofs}$$

where V_{ofs} is the error voltage, which varies with the output current and the chip temperature. The output voltage is about four times the voltage at pin 4.

The V_4-value can be classified into three ranges according to the output state :

A : V_{OH} is at or near 0V
B : V_{OH} is four times the gain
C : V_{OH}-value is saturated

An oscillation may occur if a circuit having an output impedance of more than a few hundred ohms is connected to pin 4. In this case, connect a capacitor of at least 3300pF between pin 4 and GND.

(2) Thermal shutdown circuit

The thermal shutdown circuit turns off the driver output if the chip temperature rises to about 150℃. The shutdown signal is not latched.

(3) Make sure that pin voltages will not exceed the supply voltage by more than 0.3V or will not become less than the GND pin voltage by more than 0.3V.

C_1 : Power supply filter capacitor. Place as near as possible to pin 1.

C_2, C_3 : Capacitors to prevent both output transistors being turned on at the same time.

C_4 : Surge voltage absorbing capacitor

C_5 : Oscillation preventing capacitor. An oscillation may occur if a circuit having an output impedance of more than a few hundred ohms is connected to pin 4. In this case, connect a capacitor of at least 3300pF.

R : Resistor used for reducing collector loss and limiting the short-circuit current. A resistance range of 4.7 ~ 10Ω is recommended.

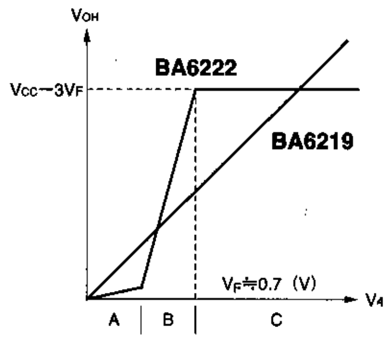


Fig.3

●Electrical characteristic curves

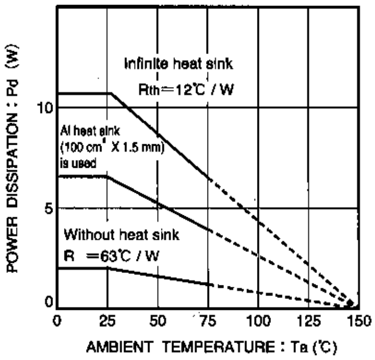


Fig.4 Power reduction curves

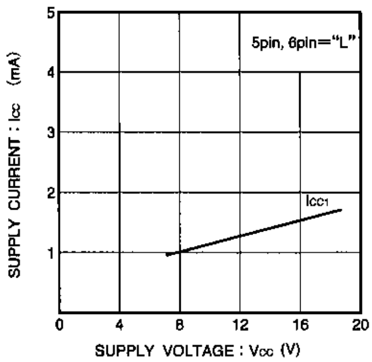


Fig.5 Circuit current 1 vs. power supply voltage

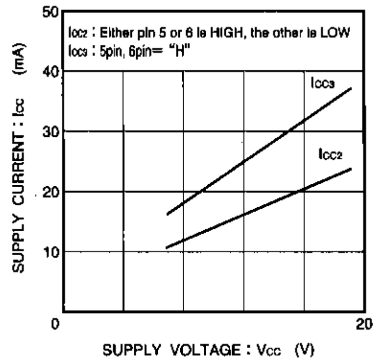


Fig.6 Circuit voltage 2, 3 vs. power supply voltage

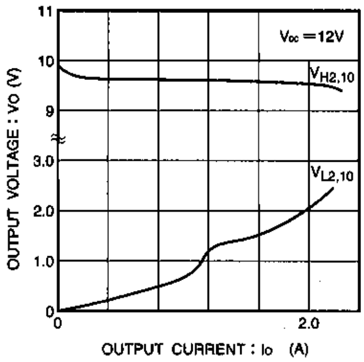


Fig.7 "H" and "L" level voltage vs. output current

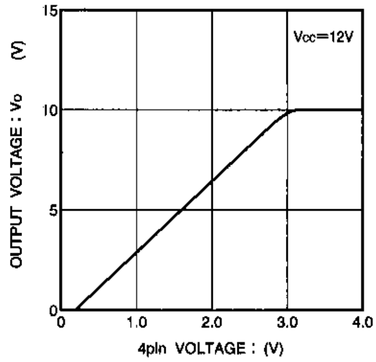
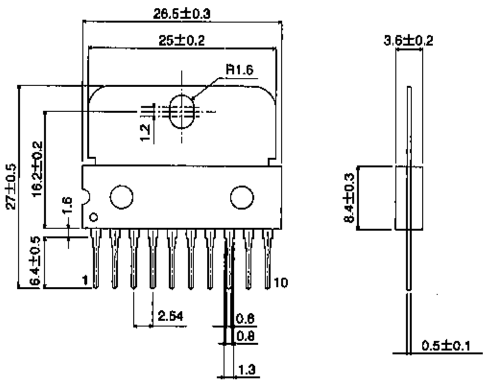


Fig.8 Output voltage vs. 4 pin voltage

● External dimensions (Units: mm)



HSIP10